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Comparison of Two Types of Instruction in Physical Education

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ABSTRACT-- *This study aimed to know the effectiveness of physical education learning models using polar global positioning system (GPS) tool. This study evolved 57 students of class VII (12-13 years old) of Junior High School Lab School UPI Bandung. The researchers used quasi-experimental research using counterbalanced design. The instruments were Polar GPS RC3 and Polar Heart Rate Sensor H3 to measure the students' heart rate and distance during the learning process. The study showed that the average acquisition of the students' heart rate and distance during the learning process with the tactical learning model was higher than the technical learning model. It can be concluded that tactical learning model is more effective than technical learning model to be applied to the sport games learning if reviewed from the aspects of the students' heart rate as well as the distance.*

Keywords*: tactical learning model; technical learning model; polar GPS; distance; heart rate.*

I. INTRODUCTION

Global Positioning System (GPS) is a system functioning to provide information to determine the position, the three-dimensional speed, and the time information continuously (Aughey, 2011). In some developed countries, this technology has been integrated to various electronic devices as well as the daily accessories to facilitate in monitoring the one's position and the activities done (Iacobucci, 2017; Li et al., 2016). The use of this technology has been employed in health center or hospital to monitor the patients and to monitor athletes during their training (Beenham et al., 2017; Castellano & Casamichana, 2010; Dallaway, 2013; Malik et al., 2018). However, only few researchers have implemented the GPS technology as a media to evaluate the physical education learning at schools. In fact, polar GPS has various measurement features proven validity levels and can be used to measure the one's physical activity (Coutts & Duffield, 2010; Duffield et al., 2010; MacLeod et al., 2009; Abilleira-González et al., 2019).

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Physical education or physical learning is a subject taught from primary level to secondary level. Even, in some universities, exclude sport faculty, this subject is taught because it has positive effect to the development of cognitive, affective, and psychomotor as well to develop the individual' potential (Rokhayati et al., 2017). Related to the physical education in the schools, various learning models were applied by teachers in order to have effective learning process in the classroom to gain learning outcomes in accordance with the learning objectives (Malik, 2013). The effectiveness in teaching can be seen from the teachers' feedbacks and the students' activeness during the learning process as well as the use of the effective time (Juditya et al., 2019; Suherman, 2009). One of the learning models is commonly used is technical learning model. This model is a practical learning because the students only follow the instructions given by the teachers although it has a tedious impression during the learning process (Kastrena et al., 2019). Another study stated that technical learning model was less attractive for the students because the monotonous learning atmosphere and most of learning time wasted on the basic technic training (Nur et al., 2019).

On the other hand, although the technical learning model is favored in term of mastering basic technique but it can eliminate the essence of the game itself that required tactical competence. In order to answer the challenge, learning model pat-tern by applying play activities were developed by implementing a real game pattern system called tactical learning model (Mitchell et al., 1997). This model employed game activities, which carried out fun and interesting activities as well as oriented to learning material in order the learning process can increase the students' competence (Nur et al., 2019).

Tactical learning model aims to encourage the students to solve the tactical problems in the games. This model emphasize on how the students can understand the game concept in physical games based on the needs to increase the learning quality of physical games. Various learning models can make the educators confused on choosing the right learning model, which fit to the learning materials as well as the students' characteristics. Thus, this study aimed to know the effectiveness of the physical education learning model by using polar GPS tool. The learning models studied here were tactical and technical learning models.

II. METHOD

Design

This study was a quasi-experimental with the counterbalanced design (Fraenkel et al., 2012). This evolved two groups, given two treatment models in two cycles with four meetings including the final test. The first group got the first treatment (tactical learning model) and the second group got the second treatment (technical learning model). Then, both groups were tested. These steps were done twice during the study.

Participants

The participants were 57 students from two classes (D = 29 students, E= 28 students) with the average age between 12-13 years old in Junior high school Lab School UPI Bandung, Indonesia. The students got the technical and tactical learning models alternately for two cycles. However, due to the limited tools, there were only 16 students who used polar GPS, eight students represented every class.

Measures

The instruments used in this study were polar GPS RC3 and polar Heart Rate Sensor H3. Polar GPS RC3 was a watch used by the students' hand and function as a tool to detect the students' position and movement during the learning process. Meanwhile, polar Heart Rate Sensor H3 was used on the students' body to know the students' heart rate by sending the heart rate signal from the tools to the website. The data of measurement result was integrated to

polarpersonaltrainer.com. The results of the measurements were in the forms of distance information and the students' heart rate that displayed on the website.

Procedure and Data analysis

This study was conducted for a month and done with two cycles to know the consistency of the study result. The result of the study can be downloaded from polar-personaltrainer.com, which has been synchronized with Polar GPS RC3 and Polar Heart Rate Sensor H3. The students' distance data, average heart rate, and maximum heart rate during the learning process were taken automatically and continuously. In this study, the data analysis used the comparison of the average data of every learning model to know their effectiveness.

III. RESULTS

Table 1 showed the measurement result of the average heart rate and the distance during the physical learning process using both technical and tactical models. From table 1, overall, the score obtained from tactical learning model was higher than technical learning model both mean of the heart rate and the distance during the learning. More clearly, Figure 1 displayed data on the differences in the average of Heart rate mean and heart rate max in technical and tactical learning models. In the Figure 1, it showed that heart rate on cycle 1 in the technical learning model had score as 125.25. Meanwhile, tactical learning model score was 151.50. In the cycle 2, technical learning model had heart rate score 128.38 and tactical learning model had 153.00. It means that the students move actively, but the students' movement activities were higher in tactical learning model. Then, the differences in the average of distance showed in figure 2.

Table 1. Data Analysis of measurement results of heart rate and distance

	Cycle 1				Cycle 2			
	Tactical model		Technical model		Tactical model		Technical model	
	Distance (km)	Heart Rate (Bpm)	Distance (km)	Heart Rate (Bpm)	Distance (km)	Heart Rate (Bpm)	Distance (km)	Heart Rate (Bpm)
Mean	0.53	151.50	0.31	125.25	0.59	153.00	0.41	128.38
SD	0.08	5.18	0.07	5.54	0.08	5.18	0.05	5.38
Min	0.46	147.00	0.20	116.00	0.52	148.50	0.34	118.50
Max	0.65	161.50	0.40	130.50	0.71	163.00	0.48	133.00

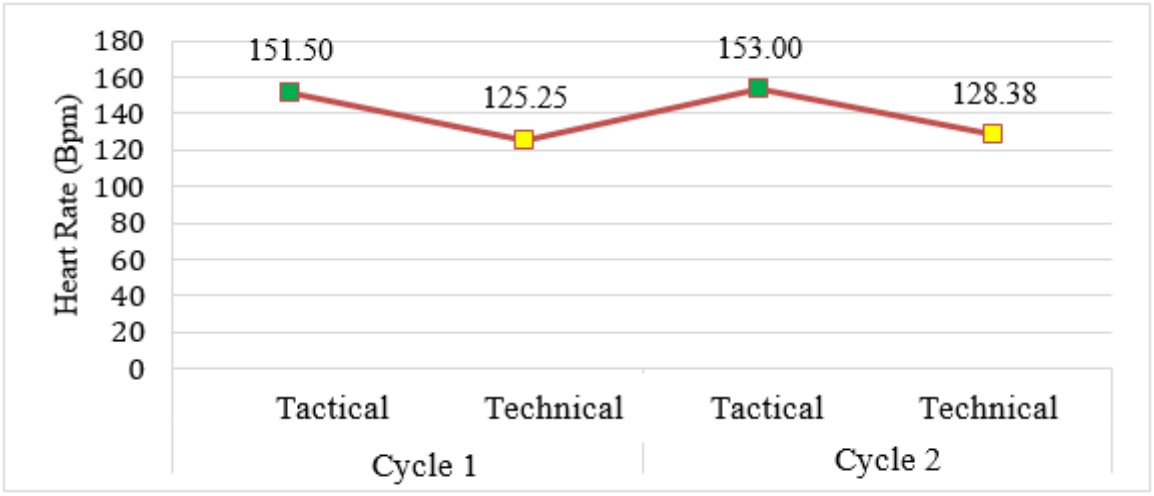

Figure 1. Differences in the average of Heart Rate in technical and tactical learning models

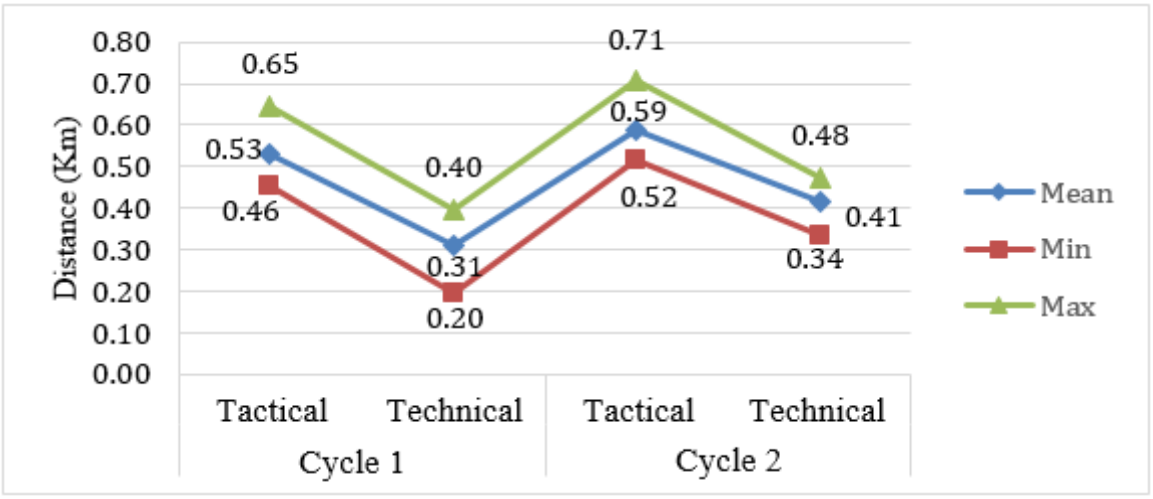

Figure 2. Differences in the average of distance score in technical and tactical learning models

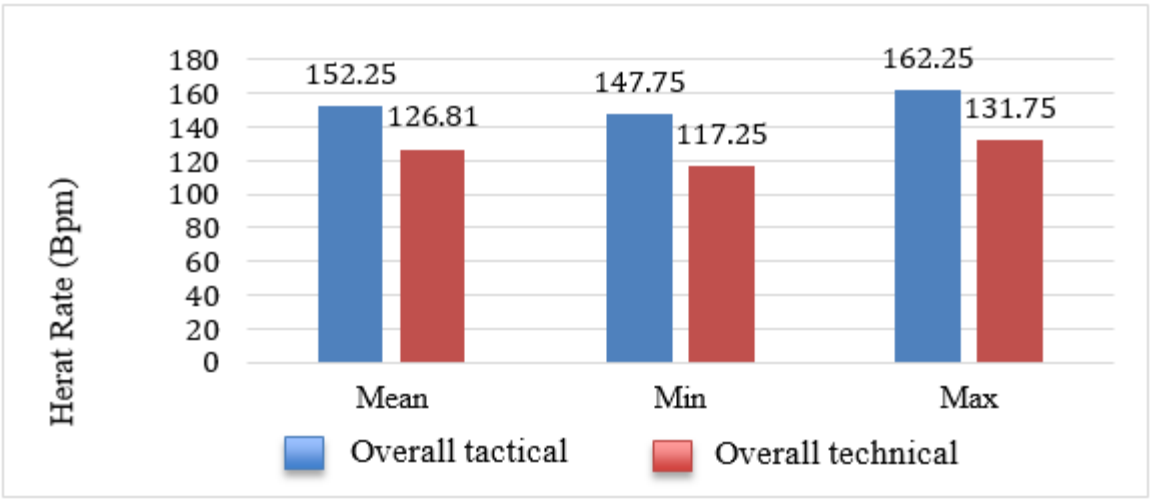

Figure 3. Differences in the average of heart rate mean, min and max in the technical and tactical learning models

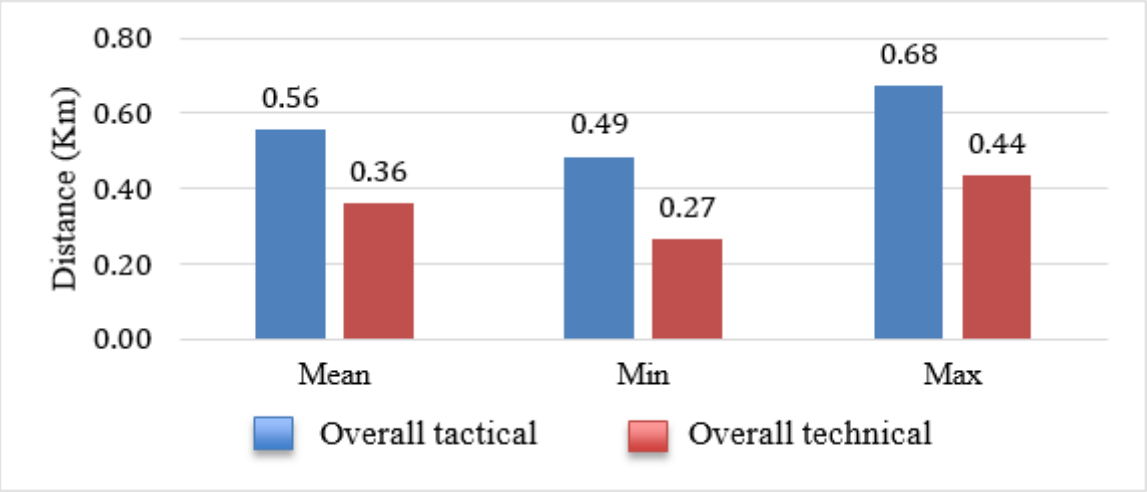

Figure 4. Differences in the average of distance mean, min, and max in the technical and tactical learning models

Figure 2 displayed that technical learning model in cycle 1 had average of distance during the learning process approximately 0.31 km with the minimal score 0.20 km and maximal score 0.40 km. Meanwhile, the minimal score of distance score in tactical learning model was 0.46 km, with the maximal score 0.65 km and the average score 0.53 km. In the cycle 2, the average of the distance in technical learning model was 0.41 km, with the minimal score 0.34 km and maximal score 0.48 km. mean-while, the tactical learning model had average score around 0.59 km, with 0.52 km as the minimal score, and 0.71 km as the maximal score. Furthermore, the data calculation displayed overall in the figure 3 and figure 4.

In the figure 3, showed that overall, the tactical learning model id higher that technical learning model when reviewed from the mean of distance, minimal score, and maximal score in cycle 1 and 2. In the figure 4, it showed the same result on distance namely tactical learning had the big distance from the technical learning process.

Table 2. Hypothesis Test in the Heart Rate and Distance

	t count		t table	Significance	
	Distance (km)	Heart Rate (Bpm)		Distance (km)	Heart Rate (Bpm)
Cycle 1	7.000	8.838	2.364	0.000	0.000
Cycle 2	6.375	10.477		0.000	0.000
Overall	6.989	9.703		0.000	0.000

Table 2 displayed the result of t-test. it showed that the result was significance > 0.05 in the cycle 1, cycle 2, and overall viewed from the distance and heart rate, it means that the tactical learning model provide more significant effects compared with the technical learning model.

IV. DISCUSSION

The aim of this study was to know the effectiveness of tactical and technical learning models by using polar GPS tool. Based on the aforementioned results of study above, it was clear that tactical learning model was more effective that technical learning model by giving neutral feedback implemented in the basketball learning. Regarding the study above, experts revealed that tactical learning model gave great contributions to the development of technique competence, understanding, and performance during the physical education learning in the schools (Alison & Thorpe, 1997; Berkowitz, 1996; Blomqvist et al., 2001; Nur'aeni et al., 2019; Nur et al., 2019).

Physical activities in the tactical learning model were higher that technical learning model. It can be seen from the result of the average of the heart rate mean on every learning model. The physical activity category in the tactical learning model was moderate to vigorous with an average heart rate of 152.25 bpm. Meanwhile, in the technical learning model was low to moderate with the average heart rate of 126.81bpm (Fjørtoft et al., 2009). Furthermore, the result of the average of the students' distance showed that tactical learning model made the students move actively with the average of the distance of 0.56 km which was higher than 0.20 km, compared with the technical learning model. The use of technology as part of evaluating the physical activity of students helps greatly facilitate the teacher. In addition, the application of technology can also be useful in training various physical activities of students. Lovecchio et al. (2019) revealed that the application of technology in improving foot function in high school students and the use of technology attract students in learning so as to proactively involve students. Childhood and preadolescence are the most critical stages of human development, due to major changes in physical, emotional and social levels (Navarro-Patón, 2020). Therefore, the use of technology that is collaborated with physical education in schools correctly and wisely can improve children's development.

Werner et al. (1996) and Dyson et al. (2004) explained that tactical learning model is more comprehensive in developing the students' learning outcomes than technical model. In addition, Chatzipanteli et al. (2014) strengthen the existence of the tactical learning model in the result of their study. Furthermore, despite being more effective, tactical model was able to develop the metacognitive behavior in physical education learning.

V. CONCLUSIONS

The use of polar GPS can be used as a tool to measure the heart rate and distance during the learning process as the material to evaluate the learning process. As the conclusion, tactical learning model is more effective than technical learning model in the physical education learning. Thus, physical education teachers in their teaching, especially game sports material, considerably apply tactical learning model for junior high school students.

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